

BURN CARE

Original Release/Approval	1 Oct 06	Note: This CPG requires an annual review.	
Reviewed:	Oct 2008	Approved:	21 Nov 2008
Supersedes:	JTTS Clinical Practice Guideline for Burn Care and Fasciotomy of the Burned Extremity, Nov 07		

1. Goal. The large number of burn casualties treated by coalition forces in the Iraq and Afghan combat theatres has prompted a reevaluation of the optimal treatment plan. Many lessons have been learned and re-learned during the last five years of treating casualties during Operation Iraqi Freedom/Operation Enduring Freedom (OIF/OEF).

2. Background. Burn patients are very labor intensive and consume significant personnel and logistical resources. Despite the best efforts of providers at each level of care, the mortality for burn casualties, who cannot be evacuated out of the theater of operation, is significantly higher than that experienced in US facilities (Table 1). Experience among US treatment facilities in the past 3-4 years reveals no survivors among host nation casualties sustaining full thickness burns to 50% or greater total body surface area (TBSA). The spread of infection in large open wards is a genuine concern, and can threaten the clinical outcome of non-burn patients. Furthermore, the average burn patient in accredited Burn Centers in the US stays 1-2 days for each percent of burn. These factors have prompted a re-evaluation of the optimal treatment plan based on severity of injury, treatment facility capabilities, and potential for evacuation. The following recommendations assist the physician in making patient management decisions unique to the deployment environment. Chapter 28 of the 2004 edition of the *Emergency War Surgery Handbook* is an excellent general reference for burn care.

In every case of a partial and/or full-thickness burn >20% TBSA, use of the Burn Patient Admission Orders (Appendix A) and the JTTS Burn Resuscitation Flow Sheet (Appendix B) are required, especially if the patient may transfer to another facility.

3. Guidelines for Coalition Casualties who can be Evacuated Out of Country

- a. Protect airway early using as large-sized an endotracheal tube (ETT) as possible. 8 mm is strongly preferred, especially if inhalation injury is suspected or noted on bronchoscopy. A large ETT tube ensures ease of bronchoscopy and facilitates pulmonary suction, which are critical with inhalation injuries.
- b. Calculate burn size using a Lund and Browder chart (Appendix C).
- c. Initiate resuscitation using a standard burn formula (1-2 mL/kg/%BSA) (see Burn Resuscitation Flow Sheet)) and avoid boluses if possible; preference is given to increasing the rate of intravenous fluids to maintain adequate urine output (UOP), as described below.
- d. **Monitor UOP closely and decrease or increase the LR infusion 20% per hour to maintain a UOP of 30-50 mL/hour**
 - 1) Over-resuscitation is as harmful as under-resuscitation; patients who receive over 6 mL/kg/%BSA burn are susceptible to severe complications (ALI/ARDS/MODS/ACS).
 - 2) Hour-to-hour fluid management is critical, particularly during the first 24 hours.

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- 3) Use of the Burn Resuscitation Flow Sheet to record fluid intake and UOP is mandatory. Refer to Appendix D for the Burn Resuscitation Flow Sheet Protocol.
- e. Keep the patient warm.
- f. Debride in the operating room (OR) with hibiclens, removing all blistered or sloughing skin (do not perform excision).
- g. Perform escharotomy and/or fasciotomies early if pulses are not palpable and circumferential burns are present. Reference JTTS CPG Fasciotomy of the Burned Extremity.
- h. Wrap burns on scalp, trunk, neck, and extremities in 5% Sulfamylon solution soaked dressings TID and as needed to keep dressings moist:
 - 1) There is less mess as opposed to Sulfamylon or Silvadene cream
 - 2) Easier for receiving institution to clean and evaluate upon arrival
- i. Measure abdominal compartment pressure for casualties with large burns and those who receive a large resuscitation. Pressures > 25 mm Hg warrant intervention to include a possible decompressive laparotomy.
- j. Shave and debride face and scalp.
- k. Apply Sulfamylon cream to ear burns BID.
- l. Apply Bacitracin to face burns QID.
- m. If available, consult ophthalmology for all patients with deep facial burns or corneal injury verified by Wood's lamp exam.
 - 1) Apply Bacitracin ophthalmic ointment to eye lids QID.
 - 2) Apply Erythromycin ophthalmic ointment in the eyes QID.
- n. Change dressings every day until evacuated.
- o. Consult the Army Burn Center at the USAISR at DSN 312-429-2876 or burntrauma.consult@us.army.mil.
- p. Consult the in-theater Burn Consultant, located in Iraq, at cell phone # 914-822-1443.

4. Guidelines for Host Nation Burn Casualties

- a. **Triage casualties with full thickness burns of 50% or greater TBSA as expectant and provide adequate comfort measures. This requires careful and accurate calculation of burn size using a Lund and Browder chart (Appendix C).**
- b. Remember that inhalation injury, comorbidities, and extremes of age, in addition to the burn, increase mortality. Take these factors into consideration as treatment plans are initiated.
- c. For patients with combined partial and full thickness burns of 50% TBSA or greater, with less than half of the burn being full thickness, initially treat the patient as above and allow the partial thickness component to declare itself after 2 days. It is initially sometimes difficult to determine the full extent of the full thickness burn. After 48 hours, reassess the percentage of full thickness burn.

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- d. For patients with a less than 50% TBSA burn, attempts at early excision and grafting are recommended.
- e. Presently, no allograft (cadaveric skin) or xenograft (Pig skin) is available in theater; therefore, the extent of excision should be guided by the amount of autograft donor skin available, meshing no wider than 3:1.
- f. Consider using a Negative Pressure Wound Dressing (NPWD) over fresh graft with intervening non-adherent layer (i.e. Dermanet, Silverlon) and leave in place for 3-5 days.
- g. Following NPWD removal, use Sulfamylon moistened gauze dressings for the next 5-7 days before transitioning to Bacitracin.
- h. Initially excise only as much area as donor skin is available to cover.
 - 1) Do not excise wounds and leave open. If patients arrive in this state, re-excise and apply a NPWD until granulation tissue is present.
 - 2) Rarely there is a need to mesh skin wider than 2:1.
- i. Take the patient to the OR for staged excisions and grafting of the full thickness burns with a goal of complete excision within one week of injury.
- j. Once grafts are healed, continue to keep patient clean using showers, when available.
- k. Early ambulation and physical therapy, with range of motion of all affected joints, is critical to the long-term functioning of these casualties.
- l. Early and continuous nutrition is vital to wound healing. Use a nasogastric feeding tube and supplement with high protein, low fat tube enteral feedings, even when patient is able to eat. Utilize nutritionist whenever available. Supplement diet with a daily multivitamin.
- m. Questions about burn care in theater can be answered by the in-theater burn consultant who can be reached at DSN 318-239-7664 or MCI 914-822-1443.

5. Pitfalls

- a. Excising uninfected full thickness burns before having donor skin to cover the wound.
- b. Pseudomonas infections:
 - 1) High rate of graft loss
 - 2) Ominous sign
 - 3) Liberal use of Dakin's solution
 - 4) Delay subsequent grafting until topical pseudomonas is well-treated
- c. Transition from aggressive care to comfort care:
 - 1) Difficult decision
 - 2) Initial burn may appear survivable but graft loss, topical infections, or donor site conversion may convert a potentially survivable injury into a non-survivable injury
 - 3) Be aware of this possibility and the need for potential change to an expectant category
 - 4) Elicit opinions from medical leaders, partners, and nurses, as this is a decision that should not be made solely by the treating physician.

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- d. Consider inhalational injury in relationship to the TBSA burned when deciding whether to treat the patient or deem the patient expectant. (I.E., a patient with a 40% TBSA burn and an inhalational injury will likely not do as well as a patient with a 40% TBSA burn and no inhalational injury.)
- e. Perform large dressing changes in the OR (not ICU or ICW), especially early in the treatment process:
 - 1) Better evaluation
 - 2) Improved ability to clean wounds
 - 3) Improved pain control

6. Recommendations for Complicated Burn Care

- a. Recommendations for the difficult fluid resuscitation:
 - 1) At 12-18 hours post-burn, calculate the PROJECTED 24-hour resuscitation if fluid rates are kept constant. If the projected 24-hour resuscitation requirement exceeds 6 mL/kg/%TBSA, the following steps are recommended:
 - a) Initiate 5% albumin early as described previously in the *Emergency War Surgery Handbook*.
 - b) Check bladder pressures every 4 hours.
 - c) If available, strongly consider monitoring central venous pressures from a subclavian or IJ catheter, along with central venous O₂ saturations. (Goal CVP 8-10cm H₂O, ScvO₂ 60-65%.) If CVP readings are not at goal, increase fluid rate. If CVP is at goal, consider vasopressin 0.02-0.04 Units/min to augment MAP (and thus UOP) or dobutamine 5 mcg/kg/min IV (titrate until SvO₂ or ScvO₂ at goal). The maximum dose of dobutamine is 20 mcg/kg/min. If CVP and SvO₂ or ScvO₂ are at GOAL, stop increasing fluids (EVEN if UOP < 30 mL/hr). Consider the patient hemodynamically optimized and that the oliguria is likely a result of an established renal insult. Tolerate and expect some degree of renal failure. Continued increases in fluid administration, despite optimal hemodynamic parameters, will only result in “resuscitation morbidity,” that is often times more detrimental than renal failure.
 - d) If the patient becomes hypotensive and oliguric (UOP < 30 mL/hr), then follow the hypotension guidelines.
 - e) Every attempt should be made to minimize fluid administration while maintaining organ perfusion. If UOP > 50 mL/hr, then decrease the fluid rate by 20%.
 - 2) After 24 hours, titrate LR infusion down to maintenance levels and continue albumin until the 48-hour mark.
 - 3) War burn patients have exhibited multi-system injury to include soft tissue injury secondary to blunt/penetrating injury/blast and inhalational injury which all affect resuscitation amounts and may result in marked increased fluid needs above and beyond standard burn resuscitation formulas. The air evacuation environment may also increase fluid requirements and wound edema.

b. Recommendations for hypotension:

- 1) The optimal minimum blood pressure for the burn patient must be individualized. Some patients will maintain adequate organ perfusion (and thus have adequate UOP) at MAPs lower than 70 mm Hg. True hypotension must be correlated with UOP. If a MAP is not adequate (generally < 55 mm Hg) to maintain the UOP goal of at least 30 mL/hr, the following steps are recommended.
 - a) Vasopressin 0.02-0.04 units/min IV drip (DO NOT TITRATE)
 - b) Monitor CVP (Goal 8-10 cm H₂O)
 - c) If CVP not at goal, increase fluid rate
 - d) If CVP at goal, add Levophed (norepinephrine) 2-20 mcg/min IV
 - e) If additional pressors are needed, reevaluate the patient. These patients may be volume depleted but also suspect a missed injury. Consider a dobutamine drip at 5 mcg/kg/min IV. The maximum dose of dobutamine is 20 mcg/kg/min. If hypotension persists, look for a missed injury. Consider adding epinephrine or neosynephrine as a last resort.
 - f) If the patient exhibits catecholamine-resistant shock, consider the following diagnoses:
 - Missed injury and on-going blood loss.
 - Acidemia. If pH < 7.20, adjust ventilator settings to optimize ventilation (target PCO₂ 30-35 mm Hg). If despite optimal ventilation, patient still has a pH < 7.2, consider bicarb administration.
 - Adrenal insufficiency. Check a random cortisol and start hydrocortisone 100 mg every 8 hours.
 - Hypocalcemia. Maintain ionized calcium > 1.1 mmol/L.

c. Recommendations for inhalational injury:

- 1) Inhalation injury is further exacerbated by retained soot and chemicals. Remember, inhalation injury is mostly a chemical injury that will benefit from removing the chemical.
- 2) Upon arrival, if patients are found to have visible soot in the airways, make every attempt to débride, through bronchoscopic; suction as much soot as possible. In addition, keep in mind that irrigation may actually make the injury worse by transporting injurious substances to new, uninjured parts of the lung; so, irrigate judiciously.
- 3) If a diagnosis of inhalation injury is made, use aerosolized heparin 5000 units every 4 hours. Mix heparin with albuterol, as heparin can induce bronchospasm.

d. Recommendations for abdominal compartment syndrome:

- 1) Massive fluid replacement (> 6 mL/kg/% burn) has led to abdominal compartment syndrome (increased bladder pressure, increased airway pressures, decreased UOP, hypotension) and extremity compartment syndromes (beyond standard escharotomy treatment).

- 2) If the patient requires a decompressive laparotomy, do a full midline incision (NOT a small mini-laparotomy incision) followed by a temporary abdominal closure. If the abdominal wall skin is burned, an Ioban dressing will not adhere to the burnt skin. Use a traditional Bogotá bag or 3 L NS IV bag sewn to the skin (keep loose).
- e. Recommendations for escharotomy/fasciotomy
 - 1) The requirement for escharotomy or fasciotomy usually presents in the first few hours following injury. If the need for either procedure has not presented in the first 24 hours, then circulation is likely to remain adequate without surgical intervention. For this reason, it would be unusual for a patient to require a new escharotomy or fasciotomy by the time of arrival at a Level IV facility.
 - 2) More likely, a patient with previous escharotomy or fasciotomy performed in the field might require extension of the incision or placement of a second incision on the other side of an extremity to restore circulation. This can occur if significant volumes of intravenous fluid are given in transit between the time of initial escharotomy and patient arrival at a rear medical facility.
 - 3) On arrival, assess distal circulation of all extremities by palpating the radial, dorsalis pedis, and posterior tibial arteries. If a pulse is palpable in one or more arteries in each extremity, neither escharotomy nor fasciotomy are indicated, nor are serial assessments appropriate. Elevate injured extremities 30-45°. Use Doppler ultrasound to assess distal circulation in the absence of palpable pulses. Absent Doppler signals or pulses that are diminishing on serial exam 30 minutes to one hour apart should prompt consideration of escharotomy.
 - 4) Escharotomy is normally performed when an extremity has a circumferential full thickness burn. If the burn is superficial or not circumferential and pulses are absent, consider inadequate circulation from other causes such as hypovolemia, hypotension, or occult traumatic injury.
 - 5) Extend escharotomy incisions the entire length of the full-thickness burn and carry across the joint when the burn extends across the joint. In the lower extremity, make a mid lateral or mid axial incision with a knife or electrocautery through the dermis to the level of fat. It is not necessary to carry the incision to the level of fascia. Although full thickness burn is insensate, the patient will often require intravenous narcotics and benzodiazepines during this procedure. Give morphine 2-5 mg IV and midazolam 1-2 mg IV at 5-10 minute intervals as needed. On completion of midlateral or midmedial escharotomy reassess the pulses. If circulation is restored, bleeding should be controlled with electrocautery and the extremity dressed and elevated at a 30-45° angle. Assess pulses hourly for at least 12-24 hours. If circulation is not restored, perform a second incision on the opposite side of the extremity.
 - 6) For upper extremities, place the hand in the anatomic position (palm facing forward) and make an incision in the mid radial or mid ulnar line. Ulnar incisions should stay anterior (volar) of the elbow joint to avoid the ulnar nerve, which is superficial at the level of the elbow. If pulses are not restored, a second incision may be necessary on the opposite side of the extremity. If both the hand and arm are burned, continue the incision across the mid ulnar or midradial wrist and onto the mid ulnar side of the hand or to the base of the thumb and then the thumb webspace.

- 7) Finger escharotomies are controversial. Before performing finger escharotomies, consider that there is little other than bone and tendon in the fingers and that fingers burned badly enough to require escharotomy frequently end up as amputations. If finger escharotomies are performed, avoid functional surfaces (radial surface of the index and ulnar surface of the little finger). Place the fingers in a clenched position and note the finger creases at DIP and PIP joints. Escharotomy incisions should be just dorsal to a line drawn between the tops of these creases.
- 8) If bilateral extremity incisions do not restore circulation, re-evaluate the adequacy of the patient's overall circulation. A well-resuscitated adult burn patient should have a clear sensorium, a heart rate in the range of 110-130 beats per minute, and a UOP of 30 mL/hr or more.
- 9) In unusual cases, following escharotomy, fasciotomy may be necessary to restore circulation. In the absence of an electrical burn and/or an underlying fracture, in the civilian burn population, fasciotomies on burned extremities are rarely, if ever, indicated or performed. Exact fluid resuscitation utilizing the burn flow sheet and prompt escharotomy prevents the need for a subsequent fasciotomy in almost all cases. In the combat environment, however, with its higher propensity for orthopedic injuries, the need for fasciotomies, even after properly performed escharotomies, is sometimes indicated. In the combat casualty, fasciotomies on burned extremities may be required for the following:

- Crush or electrical injuries

- Fractures

- Penetrating projectile wounds

- Delayed revascularization

- Polytrauma that creates a need for massive resuscitation

Outside of these indications, the need for fasciotomy is rare and fasciotomy should only be performed for the clinical diagnosis of compartment syndrome, as diagnosed by clinical exam, and if available, confirmed by measurement of compartment pressures.

In the absence of crush injury, fracture, multiple trauma, over-resuscitation, electrical injury or similar indications, prophylactic fasciotomies on burned extremities increase morbidity and mortality and are not indicated. High altitude as associated with aeromedical evacuation is not, in and of itself, a contributor to the development of compartment syndrome in a burned extremity, and therefore is not an indication for a prophylactic fasciotomy.

If long range air evacuation is imminent, and there is concern for a delayed compartment syndrome that could go unrecognized in flight, consideration should be given, as the overall patient condition warrants, to delaying evacuation. Following the patient with serial exams and/or compartment pressures in a facility where fasciotomies can be immediately performed if necessary, is a valid clinical decision. Evacuation can proceed once the following has occurred.

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Clinical exam and/or compartment pressures have stabilized and the patient is no longer assessed to be at risk for delayed compartment syndrome

Compartment syndrome has developed and complete 4 compartment fasciotomies have been performed.

- 10) Following escharotomy or fasciotomy, late bleeding may occur as pressure is decompressed and circulation restored. Examine the surgical site every few minutes for up to 30 minutes for signs of new bleeding, which is usually easily controlled with electrocautery.

7. Responsibilities. It is the trauma team leader's responsibility to ensure the burn clinical practice guideline is followed. It is the responsibility of the nurse assigned to the trauma bay/patient to ensure the Burn Flow Sheet is initiated and completed.

8. References.

- ¹ *Emergency War Surgery Handbook*

Approved by CENTCOM JTTS Director, JTS Director
and Deputy Director and CENTCOM SG

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Table 1. US Burn Mortality in American Burn Association Verified Burn Centers.

Age Group	0.1-9.9	10-19.9	20-29.9	30-39.9	40-49.9	50-59.9	60-69.9	70-79.9	80-89.9	≥90	Total
birth - 1.9	0.0%	0.2%	2.1%	4.5%	6.6%	10.9%	50.0%	42.1%	73.3%	60.0%	0.7%
Died/Total	1/6655	3/1926	8/389	7/157	5/76	5/46	12/24	8/19	11/15	3/5	63/9312
2 - 4.9	0.2%	0.1%	3.2%	5.7%	7.9%	12.5%	22.6%	31.3%	54.5%	76.2%	1.6%
Died/Total	7/3449	1/1086	11/341	9/159	6/76	6/48	7/31	10/32	12/22	16/21	85/5265
5 - 19.9	0.1%	0.2%	1.2%	3.3%	9.3%	9.9%	18.3%	30.9%	39.3%	55.9%	1.5%
Died/Total	11/7346	4/2441	10/838	13/400	20/216	15/151	19/104	21/68	24/61	38/68	175/11693
20 - 29.9	0.2%	0.8%	2.2%	3.7%	11.3%	17.0%	31.5%	42.3%	62.7%	77.6%	2.4%
Died/Total	11/5998	16/2065	16/720	12/324	24/212	23/135	28/89	22/52	32/51	52/67	236/9713
30 - 39.9	0.3%	0.7%	4.3%	7.7%	14.2%	26.5%	37.9%	52.7%	66.7%	82.9%	3.4%
Died/Total	18/6346	15/2287	35/811	33/426	33/233	41/155	36/95	49/93	46/69	58/70	364/10585
40 - 49.9	0.6%	1.4%	5.6%	14.9%	27.4%	36.6%	42.9%	58.8%	76.5%	85.5%	4.9%
Died/Total	31/5635	28/1957	41/738	55/368	61/223	53/145	45/105	40/68	39/51	65/76	458/9366
50 - 59.9	1.1%	3.0%	9.8%	22.7%	38.7%	56.3%	69.6%	81.6%	78.0%	84.4%	8.0%
Died/Total	36/3378	36/1198	50/510	58/255	55/142	63/112	39/56	40/49	32/41	54/64	463/5805
60 - 69.9	2.5%	8.6%	17.5%	36.0%	65.9%	72.4%	71.0%	88.6%	87.5%	76.1%	12.8%
Died/Total	45/1835	67/776	64/366	50/139	56/85	42/58	22/31	31/35	21/24	35/46	433/3395
≥70	7.2%	25.5%	52.7%	69.6%	80.1%	95.6%	94.6%	87.1%	91.9%	91.5%	27.6%
Died/Total	170/2348	281/1101	207/393	179/257	109/136	109/114	70/74	61/70	34/37	43/47	1263/4577
Total	0.8%	3.0%	8.7%	16.7%	26.4%	37.0%	45.6%	58.0%	67.7%	78.4%	5.1%
Died/Total	330/42990	451/14837	442/5106	416/2485	369/1399	357/964	278/609	282/486	251/371	364/464	3540/69711

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APPENDIX A

MEDICAL RECORD – PROVIDER ORDERS

For use of this form, see MEDCOM Circular 40-5

DIRECTIONS: The provider will SIGN, DATE, and TIME each order or set of orders recorded. Only one order is allowed per line. Orders completed during the shift in which they are written will be signed off adjacent to the order and do not require recopying on other ITR forms.

DATE / TIME ORDERS

(SIGNATURE REQUIRED FOR EACH ORDER/SET OF ORDERS. SIGNATURE MUST BE LEGIBLE; PROVIDER WILL USE SIGNATURE STAMP OR PRINT NAME).

BURN PATIENT ADMISSION ORDERS (Page 2 of 5)

9. Nursing

9.1 Strict I & O and document on the JTTS Burn Resuscitation Flow Sheet Q 1hr for burns > 20% TBSA

9.2 ___ Clear dressing to Art Line/CVC, change Q 7D and prn

9.3 ___ Bair Hugger until temperature > 36° C

9.4 ___ Lacrilube OU Q 6hrs while sedated

9.5 ___ Oral care Q 4hrs; with toothbrush Q 12 hrs

9.6 ___ Maintain HOB elevated 45°

9.7 ___ Fingerstick glucose Q ___ hrs

9.8 ___ Routine ostomy care

9.9 ___ Ext fix pin site care

9.10 ___ Trach site care Q shift

9.11 ___ Incentive spirometry Q 1 hr while awake; cough & deep breath Q 1 hr while awake

10. Diet

10.1 ___ NPO

10.2 ___ PO Diet: _____

10.3 ___ TPN per Nutrition orders

10.4 ___ Tube Feeding: _____ @ _____ mL/hr OR ___ Advance per protocol

11. Burn Resuscitation (%TBSA > 20%)

11.1 Post Burn 1-8 hrs: LR at _____ mL/hr IV (0.13 mL x Wt in kg x %TBSA)

11.2 Post Burn 8-24 hrs: LR at _____ mL/hr IV (0.06 mL x Wt in kg x %TBSA)

11.3 Titrate resuscitation IVF as follows to maintain target UOP (Adult: 35-50 mL/hr; Children: 1.0 mL/kg/hr)

- Decrease rate of LR by 20% if UOP is greater than 50 mL/hr for 2 consecutive hrs
- Increase rate of LR by 20% if UOP is less than 30 mL/hr (adults) or pediatric target UOP for 2 consecutive hrs

11.4 If CVP > 10 cm H₂O and patient still hypotensive (SBP < 90 mm Hg), begin vasopressin gtt at 0.02 – 0.04 Units/min

11.5 Post burn day #2 (Check all that apply)

___ Continue LR at _____ mL/hr IV

___ Begin _____ at _____ mL/hr IV for insensible losses

___ Start Albumin 5% at _____ mL/hr IV ((0.3 – 0.5 x %TBSA x wt in kg) / 24) for 24 hrs

Physician Signature _____

Date/Time _____

MEDCOM FORM 688-RB (TEST) (MCHO) JUL 07

PREVIOUS EDITIONS ARE OBSOLETE

MC V2.00

PATIENT IDENTIFICATION (For typed or written entries
note: Name – last, first, middle initial; grade; DOB; hospital or
medical facility)

Nursing Unit Room No. Bed No. Page No.

Complete the following information on page 1 of provided orders
only. Note any changes on subsequent pages.

Diagnosis:

Allergies and reaction:

Height: _____

Weight (Kg): _____

Diet: _____

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BURN PATIENT ADMISSION ORDERS (Page 3 of 5)

12. IVF (% TBSA \leq 20%): ___ LR ___ NS ___ D5NS ___ D5LR ___ D5 .45NS ___ + KCl 20 meq/L @ ___ mL/hr

13. Laboratory Studies & Radiology

13.1 ___ CBC, Chem-7, Ca/Mg/Phos: ___ ON ADMIT ___ DAILY @ 0300

13.2 ___ PT/INR ___ TEG ___ Lactate: ___ ON ADMIT ___ DAILY @ 0300

13.3 ___ LFTs ___ Amylase ___ Lipase: ___ ON ADMIT ___ DAILY @ 0300

13.4 ___ ABG: ___ ON ADMIT ___ 30 mins after ventilator change ___ Q AM (while on ventilator)

13.5 ___ Triglyceride levels after 48 hours on Propofol

13.6 ___ Portable AP CXR on admission

13.7 ___ Portable AP CXR Q AM

14. Prophylaxis

14.1 ___ Protonix 40 mg IV Q day

14.2 ___ Lovenox 30 mg SQ BID OR ___ Heparin 5000 U SQ BID starting _____

14.3 ___ Pneumatic compression boots

15. Ventilator Settings

15.1 Mode: ___ SIMV ___ CMV ___ AC ___ CPAP

15.2 FiO₂: ___ %

15.3 Rate: ___

15.4 Tidal Volume: ___ cc

15.5 PEEP: ___

15.6 Pressure Support: ___

15.7 Insp Pressure: ___

15.8 I/E Ratio: ___

15.9 ___ APRV: Phi ___ Plow ___ Thi ___ Tlow ___ FiO₂: ___ %

15.10 ___ Maintain patient in soft restraints while on ventilator

15.11 ___ Wean FiO₂ to keep SpO₂ > 92% or PaO₂ > 70 mm Hg

15.12 ___ Nebulizer/MDIs: ___ Albuterol ___ Atrovent ___ Xopenex Unit Dose Q 4 hrs

Physician Signature _____

Date/Time _____

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MC V2.00

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	Complete the following information on page 1 of provided orders only. Note any changes on subsequent pages.			
	Diagnosis:			
	Allergies and reaction:			
	Height: _____			
	Weight (Kg): _____			
	Diet: _____			

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BURN PATIENT ADMISSION ORDERS (Page 4 of 5)

16. Analgesia/Sedation/PRN Medications

- 16.1 ____ Propofol gtt at ____ mcg/kg/min, titrate up to 80 mcg/kg/min for SAS 3-4.
- 16.2 ____ Versed gtt at ____ mg/hr, titrate up to 10 mg/hr for SAS 3-4; may give 2-5 mg IVP Q 15 minutes for acute agitation or burn wound care.
- 16.3 ____ Ativan gtt at ____ mg/hr, titrate up to 15 mg/hr for SAS 3-4; may give 1-4 mg IVP Q 2-4 hours for acute agitation.
- 16.4 ____ Fentanyl gtt at ____ mcg/hr titrate up to 250 mcg/hr ; for analgesia may give 25-100 mcg IVP Q 15 minutes for acute pain or burn wound care.
- 16.5 ____ Morphine gtt at ____ mg/hr, titrate up to 10 mg/hr, for analgesia may give 2-10 mg IVP Q 15 minutes for pain or burn wound care
- 16.6 Important: Hold continuous IV analgesia/sedation at 0600 hrs for a SAS \geq 4. If further analgesia/sedation is indicated, start medications at $\frac{1}{2}$ of previous dose and titrate for a SAS 3-4.
- 16.7 ____ Morphine 1-5 mg IV Q 15 minutes prn pain
- 16.8 ____ Fentanyl 25-100 mcg IV Q 15 minutes prn pain
- 16.9 ____ Ativan 1-5 mg IV Q 2-4 hrs prn agitation
- 16.10 ____ Percocet 1-2 tablets po Q 4 hrs prn pain
- 16.11 ____ Motrin 800 mg po TID prn pain
- 16.12 ____ Toradol 30 mg IV loading dose, then 15 mg IV Q 8 hrs for 48 hours
- 16.13 ____ Tylenol ____ mg / Gm PO / NGT / PR Q ____ hrs PRN for fever or pain
- 16.14 ____ Morphine PCA: Program (circle one): 1 2 3 4
- 16.15 ____ Zofran 4-8 mg IVP Q 4 hrs PRN for nausea/vomiting
- 16.16 ____ Dulcolax 5 mg PO / PR Q day PRN for constipation

17. Specific Burn Wound Care

- 17.1 Cleanse and debride facial burn wounds with Sterile Water or (0.9% NaCl) Normal Saline Q 12 hrs, use a washcloth or 4x4s to remove drainage/eschar
- 17.2 Cleanse and debride trunk and extremities with chlorhexidine gluconate 4% solution (Hibiclens) and Sterile Water or Normal Saline, before prescribed dressing changes
- 17.3 Change fasciotomy dressings and outer gauze dressings daily and as needed; moisten with sterile water Q 6 hours and as needed to keep damp, not soaking wet

Physician Signature _____ Date/Time _____

MEDCOM FORM 688-RB (TEST) (MCHO) JUL 07		PREVIOUS EDITIONS ARE OBSOLETE		MC V2.00
PATIENT IDENTIFICATION (For typed or written entries note: Name – last, first, middle initial; grade; DOB; hospital or medical facility)	Nursing Unit	Room No.	Bed No.	Page No.
	Complete the following information on page 1 of provided orders only. Note any changes on subsequent pages.			
	Diagnosis:			
	Allergies and reaction:			
	Height: _____ Weight (Kg): _____ Diet: _____			

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APPENDIX B

JTTS Burn Resuscitation Flow Sheet

Page 1

Date:

Initial Treatment Facility:

Name	SSN	Pre-burn est. wt (kg)	% TBSA	Estimated fluid vol. pt should receive		
				1st 8 hrs	2nd 16 hrs	Est. total 24 hrs
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Date & Time of Injury					BAMC/ISR Burn Team DSN 312-429-2876					
Tx Site/ Team	Hr from burn	Local Time	Crystallloid Colloid	TOTAL	UOP	Base Deficit	BP	MAP (>55)	CVP	Pressors (Vasopressin 0.02-0.04 u/min)
	1st									
	2nd									
	3rd									
	4th									
	5th									
	6th									
	7th									
	8th									
Total Fluids:										
	9th									
	10th									
	11th									
	12th									
	13th									
	14th									
	15th									
	16th									
	17th									
	18th									
	19th									
	20th									
	21st									
	22nd									
	23rd									
	24th									

Total Fluids:

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JTTS Burn Resuscitation Flow Sheet

Page 2

Date:

Name

SSN

Pre-burn est.
wt (kg)

% TBSA

Fluid volume ACTUALLY received

1st 8 hrs

2nd 16 hrs

24 hr Total

--	--	--	--	--	--	--

Date & Time of Injury

BAMC/ISR Burn Team DSN 312-429-2876

Tx Site/ Team	Hr from burn	Local Time	Crystallloid Colloid	TOTAL	UOP	Base Deficit	BP	MAP (>55)	CVP	Pressors (Vasopressin 0.02-0.04 u/min)
	25th									
	26th									
	27th									
	28th									
	29th									
	30th									
	31st									
	32nd									
	33rd									
	34th									
	35th									
	36th									
	37th									
	38th									
	39th									
	40th									
	41st									
	42nd									
	43rd									
	44th									
	45th									
	46th									
	47th									
	48th									

Total Fluids:

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APPENDIX C BURN ESTIMATE AND DIAGRAM

Total Area front/back (circumferential)							
		one side-- anterior	one side-- posterior				
	Adult	adult	adult	1st	2nd	3rd	TBSA
Head	7	3.5	3.5				0
Neck	2	1	1				0
Anterior trunk*	13	13	0				0
Posterior trunk*	13	0	13				0
Right buttock	2.5	na	2.5				0
Left buttock	2.5	na	2.5				0
Genitalia	1	1	na				0
Right upper arm	4	2	2				0
Left upper arm	4	2	2				0
Right lower arm	3	1.5	1.5				0
Left lower arm	3	1.5	1.5				0
Right hand	2.5	1.25	1.25				0
Left hand	2.5	1.25	1.25				0
Right thigh	9.5	4.75	4.75				0
Left thigh	9.5	4.75	4.75				0
Right leg	7	3.5	3.5				0
Left leg	7	3.5	3.5				0
Right foot	3.5	1.75	1.75				0
Left foot	3.5	1.75	1.75				0
	100	48	52	0	0	0	0

Age: _____
Sex: _____
Weight: _____

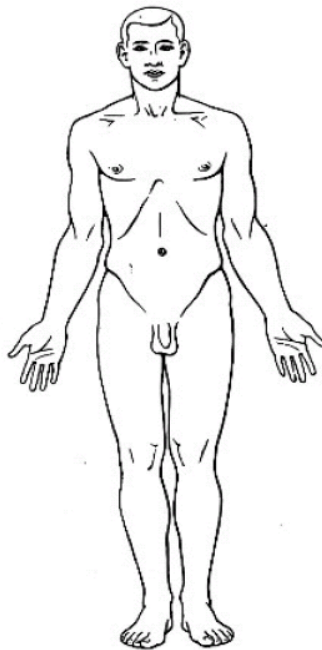


DIAGRAM A

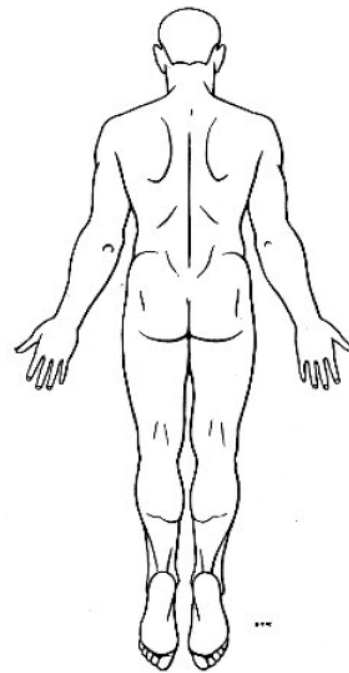
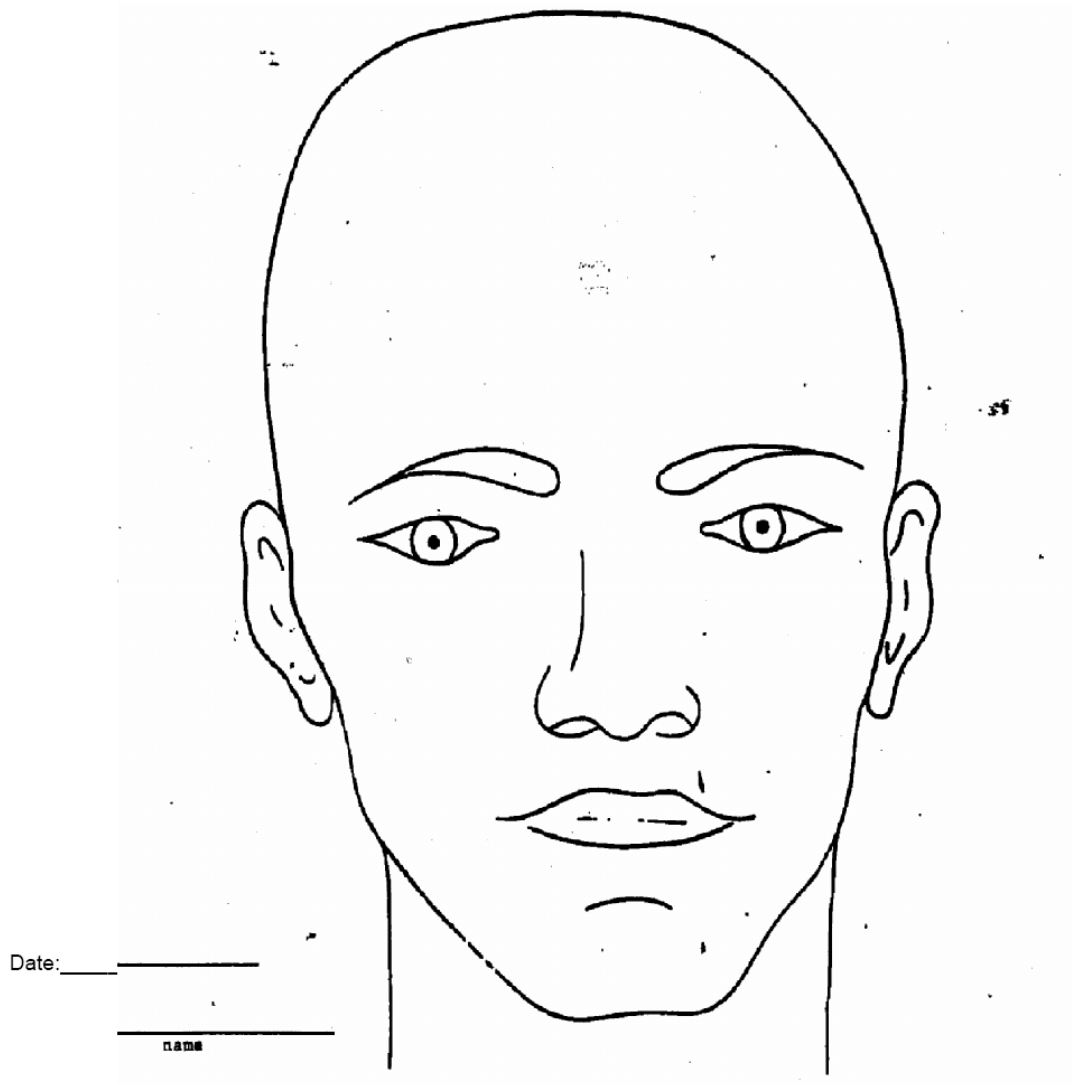


Figure 25 (17)

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BURN DIAGRAM - HEAD



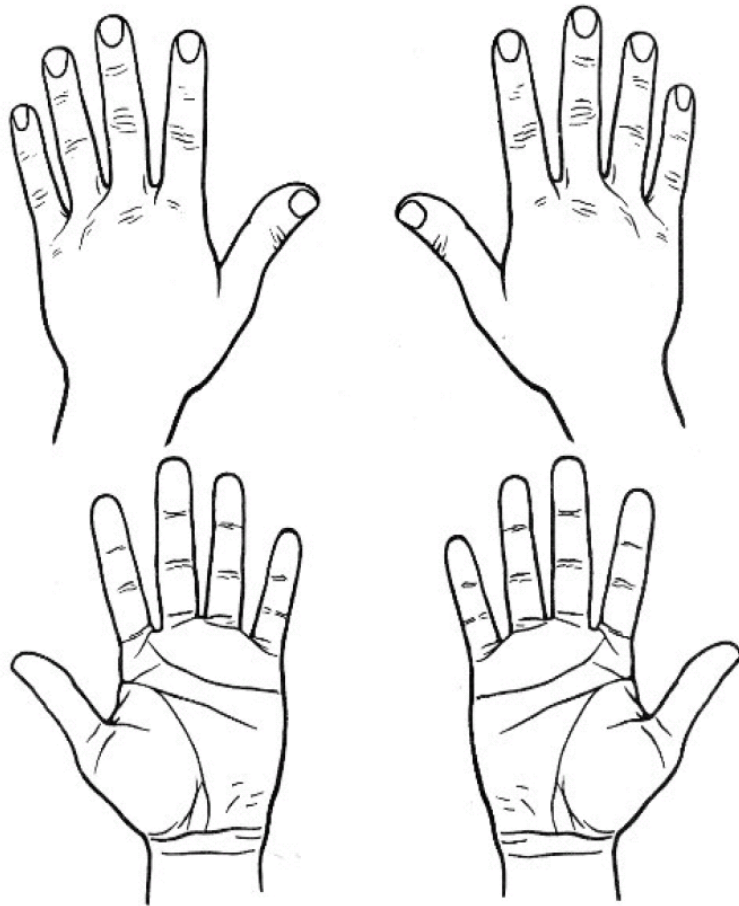


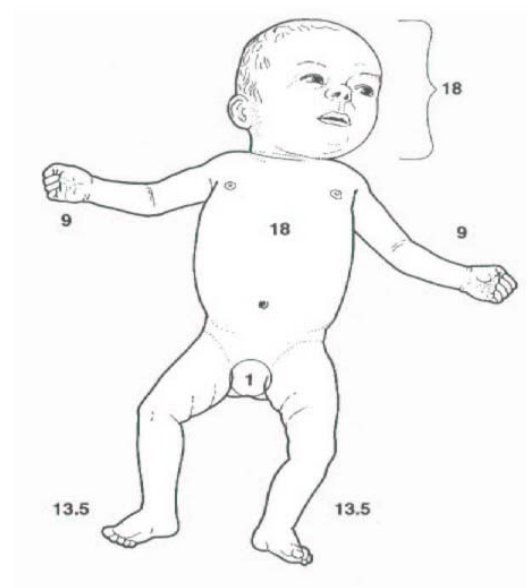
DIAGRAM F

Figure 23 (22)

Date: _____
2nd: _____
3rd: _____
Total: _____

BABY BURN ESTIMATE AND DIAGRAM

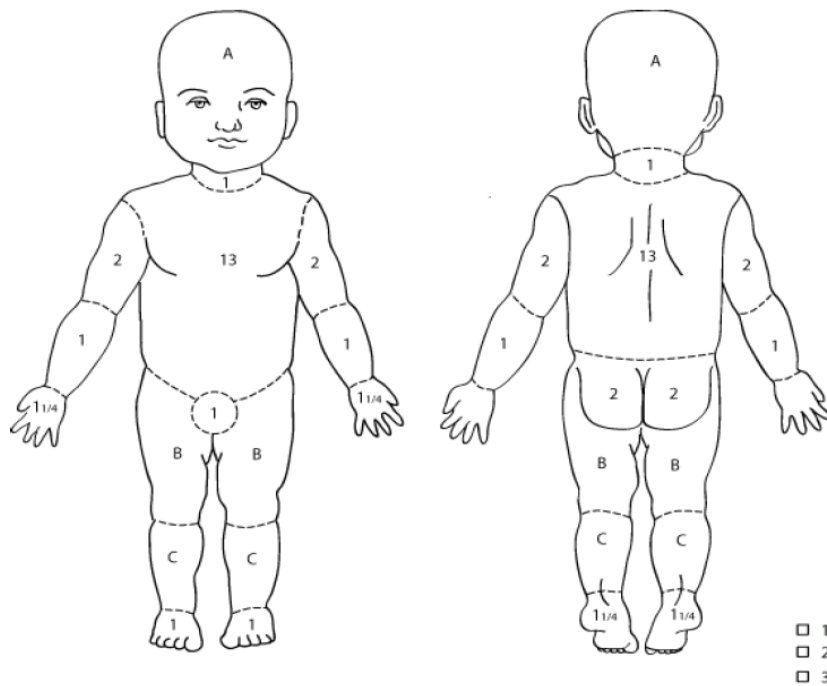
Total Area front/back (circumferenti	Birth to1 year	1st	2nd	3rd	TBSA
Head	19				0
Neck	2				0
Anterior trunk*	13				0
Posterior trunk	13				0
Right buttock	2.5				0
Left buttock	2.5				0
Genitalia	1				0
Right upper arm	4				0
Left upper arm	4				0
Right lower arm	3				0
Left lower arm	3				0
Right hand	2.5				0
Left hand	2.5				0
Right thigh	5.5				0
Left thigh	5.5				0
Right leg	5				0
Left leg	5				0
Right foot	3.5				0
Left foot	3.5				0



Joint Theater Trauma System Clinical Practice Guideline

CHILD BURN ESTIMATE AND DIAGRAM

Total Area front/back (circumferential)	1 to 4	5 to 9	10 to 14	15				
	years	years	years	years	1st	2nd	3rd	TBSA
Head	17	13	11	9				0
Neck	2	2	2	2				0
Anterior trunk*	13	13	13	13				0
Posterior trunk*	13	13	13	13				0
Right buttock	2.5	2.5	2.5	2.5				0
Left buttock	2.5	2.5	2.5	2.5				0
Genitalia	1	1	1	1				0
Right upper arm	4	4	4	4				0
Left upper arm	4	4	4	4				0
Right lower arm	3	3	3	3				0
Left lower arm	3	3	3	3				0
Right hand	2.5	2.5	2.5	2.5				0
Left hand	2.5	2.5	2.5	2.5				0
Right thigh	6.5	8	8.5	9				0
Left thigh	6.5	8	8.5	9				0
Right leg	5	5.5	6	6.5				0
Left leg	5	5.5	6	6.5				0
Right foot	3.5	3.5	3.5	3.5				0
Left foot	3.5	3.5	3.5	3.5				0



APPENDIX D

JTTS Burn Resuscitation Flow Sheet Protocol

Purpose: The JTTS Burn Resuscitation Flow Sheet provides clinicians with a tool to track burn resuscitation over a 72-hour period. Conceptually, the flow sheet creates a continuum between clinicians during the resuscitation phase. This format allows clinicians to accurately trend intake and output, hemodynamics and vasoactive medications, and promotes optimal outcomes through precise patient management.

I. The clinicians at the first medical facility where the patient receives treatment will initiate the JTTS Burn Resuscitation Flow Sheet. This treatment facility will be listed in the “Initial Treatment Facility” block. Clinicians at any level of care may initiate the flow sheet.

II. Record today’s date in the “Date” block according to the current date where the recorder is located (do not adjust this date based on the patient’s origin or destination; use the local date).

III. Record the patient’s full name and social security number in the “Name” and “SSN” blocks. Document name and SSN on all three pages of the flow sheet.

IV. Record the patient’s weight in the “Pre-burn est. wt (kg)” block. In theater, record the estimated weight based on the patient’s weight prior to injury or “dry weight.” If a patient presents prior to initiating resuscitation and an accurate weight can be easily obtained without delaying care, providers are urged to weigh the patient and record the result.

V. Record the total body surface area burned in the “% TBSA” block. Clinicians will assess the burn size and use this value to determine fluid resuscitation requirements. Following the patient’s transfer to another facility, the receiving clinicians are required to “re-map” the burn, considering that burn wound may “convert” between assessments at one facility or during transport between two facilities.

VI. Burn Fluid Resuscitation Calculations: Use the ABLS guidelines to determine fluid requirements for the first 24 hours post-burn. At 8-12 hours post-burn, reevaluate resuscitation efforts and recalculate fluid resuscitation needs. If fluid resuscitation needs exceed ABLS formula calculations, consider the guidelines established in the Emergency War Surgery Handbook and the addendum to the handbook, “Recommendations for Level IV Burn Care.” *[LRMC specific: USAISR/BAMC Burn Unit Guidelines can also be found in the LRMC Burn Care Guide]*

- a. Clinicians at the first medical facility to treat the patient will calculate the fluid requirements for the first 24 hours post-burn and record the amount in the block on page 1 labeled “Estimated fluid vol. pt should receive.”
- b. Clinicians will record the “fluid volume ACTUALLY received” during the first 24 hours of resuscitation in the block labeled as such at the top of page 2. This amount will equal the actual volume delivered during the first 24 hours (as recorded on page 1).
- c. Clinicians will transcribe the 24-hour fluid volume totals recorded on pages 1 and 2 of the flow sheet onto page 3 in the block labeled “fluid volume ACTUALLY

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received.” This allows clinicians to see the first 48-hour totals as the patient enters into the last 24 hours of the 72-hour period.

VII. Record the local date and time that the patient was injured in the “Date & Time of Injury” block. This date and time IS NOT the time that the patient arrived at the medical facility, but rather the date and time of INJURY.

VIII. Record the facility name and/or treatment team in the “Tx Site/Team”) block. The facility name/team name is the team of clinicians who managed the patient during each specified hour on the flow sheet. This team may reside within a facility, in which case the facility name is recorded, or be a transport team (e.g., Medevac, CCATT, Aerovac).

IX. “Hr from burn” is defined as the number of hours after the burn injury occurred. If a patient does not arrive at a medical facility until 3 hours after the burn occurred, clinicians do not record hourly values for hours 1-3 but begin recording in the row marked “4th” hour post-burn. To the extent possible, clinicians should confer with level I and II clinicians to determine fluid intake and urine output. These totals may be recorded in the 3rd hour row.

X. Record the current local time of the recorder in the “Local Time” block, be it Baghdad Time, Berlin Time, ZULU, or CST. As with date, do not adjust this time based on the patient’s origin or destination; use the local time.

XI. Record the total volume of crystalloids and colloids administered in the “crystalloid/colloid” column, not the specific fluids delivered. Clinicians should refer to the critical care flow sheet to determine the fluids types and volumes. This burn flow sheet is designed to track total volumes. Examples of crystalloid solutions are LR, 0.45% NS, 0.9% NS, D5W, and D5LR. Examples of colloids are Albumin (5% or 25%), blood products, and other volume expanders such as dextran, hespan, or hexend.

XII. Document the name, dosage, and rate of vasoactive agents in the “Pressors” block. Patients who receive vasoactive agents may also have invasive pressure monitoring devices (e.g., arterial line, central venous line, pulmonary artery catheter), in which case significant values should be recorded in the “BP” and “MAP (>55)/CVP” columns.

XIII. For additional burn resuscitation guidelines refer to the Emergency War Surgery Handbook and the “Recommendations for Level IV Burn Care.”

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Burn Flow Sheet Documentation

JTTS Burn Resuscitation Flow Sheet						Page 1
Date:	[1]	Initial Treatment Facility:		[2]		
Name		SSN	Pre-burn est. wt (kg)	% TBSA	Estimated fluid vol. pt should receive	
[3]	[4]	[5]	[6]	[7]	[8]	[9]
Date & Time of Injury			[10]			
BAMC/ISR Burn Team DSN 312-429-2678						

Site/ am	HR from burn	Local Time	Crystalloid (mL)	Colloid	TOTAL	UOP	Base Deficit	BP	MAP (>55)	CVP	Pressors Vasopressin 0.02-0.04 ul/min
1st											
2nd											
3rd											
4th											
5th											
6th											
7th											
8th											
9th											
10th											
11th											
12th											
Total Fluids 1st 12 hrs					[21]						
13th											
14th											
15th											
16th											
17th											
18th											
19th											
20th											
21st											
22nd											
23rd											
24th											
Total Fluids:					[22]						

[1] **Date:** Today's date

[2] **Initial Treatment Facility:** Where this form is initiated

[3] **Name:** Patient's name

[4] **SSN:** Patient's social security number

[5] **Weight (Kg):** Estimated weight PRE-BURN "dry weight"

[6] **% TBSA:** Total body surface area burned

[7] **1st 8 Hrs:** ½ total calculated fluids per burn resuscitation formula (ABLS), given over 1st 8 hrs post-burn

[8] **2nd 16 Hrs:** Remaining ½ of the calculated fluids over the next 16 hrs

[9] **Estimated Total Fluids:** Total fluids calculated for the first 24 hrs post-burn injury

[10] **Time of Injury:** Time the patient burned, **NOT** the time patient arrived at the facility

[11] **Treatment (Tx) Site/Team:** Facility, CCATT or care team providing care at specified hour

[12] **Hour From Burn:** "1st" hour is the first hour post burn. For example: pt arrives @ facility 3 hrs post-burn. Clinicians will start their charting for the "4th" hour. Enter IVF & UOP totals from level I & II care, prior to arrival at the current facility, in the "3rd" hour row.

[13] **Local Time:** Current time being used by recorder

[14a] **Crystalloid (mL):** Total crystalloid volume given over last hour (LR, NS, etc.)

[14b] **Colloid (mL):** Total colloid volume given over the last hour (Albumin 5%-25%, blood products, Hespan, etc.) **Note when using Albumin:** With large resuscitations, start 5% Albumin at the 12 hour mark; with normal resuscitations, start at the 24 hour mark.

[15] **Total:** Total volume (crystalloid + colloid) for the hour

[16] **UOP:** Urine output for last hour

[17] **Base Deficit:** enter lab value, if avail. (indicates acidemia)

[18] **BP:** Systolic BP / Diastolic BP

[19] **MAP/CVP:** MAP and/or CVP if available.

[20] **Pressors:** Vasopressin, Levophed, etc., and rate/dose

[21] **12-hr Total:** Total IVF & UOP for 1st 12 hours post-burn

[22] **24-hr Total:** Total IVF & UOP for 1st 24 hours post-burn

Pre-burn Est. Wt (kg)	%TBSA	Fluid Volume ACTUALLY received		
		1st 8 hrs	2nd 16th hrs	24 hr Total
		[a]	[b]	[c]

Page 2 (24-48 hrs)

The guidelines for page 2 remain the same as for page 1, with the exception of the calculation table. On page 2, the values in [a] and [c] are the **actual** volumes delivered and recorded from page 1, blocks 21 & 22. [b] is the **actual** volume delivered from the 9th hour through the 24th hour. These values allow caregivers to re-calculate the mL/kg/% TBSA, and evaluate for over-resuscitation

Pre-burn Est. Wt (kg)	%TBSA	Fluid Volume ACTUALLY received		
		1st 24 hrs	2nd 24 hrs	48 hr Total
		[d]	[e]	[f]

Page 3 (48-72 hrs)

The guidelines for page 3 remain the same as for pages 1 & 2, with the exception of the calculation table. On page 3, the values in [d] and [e] are the **actual** 24 hour fluid totals recorded from pages 1 & 2. [f] is the **total** volume delivered over the first 48 hrs ([d] + [e]). Once again, these values allow caregivers to re-calculate the mL/kg/% TBSA, and evaluate for over-resuscitation

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